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University of Washington
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Aeronautics and Astronautics
Bachelor of Science, June 2004

NASA Academy Research Project:
Advanced Animal Habitat
Centrifuge Project

Principal Investigator: Dr. Paul Espinosa

Education:

I am currently a senior in the Aeronautics and Astronautics Department at the University of Washington. I will be graduating with a Bachelors of Science in June of this year. Upon completion of the NASA Ames Astrobiology Academy, I will be attending the California Institute of Technology in the Aeronautics option (GALCIT). Currently, I have plans of completing a Masters degree by June of 2005. Ultimately, I hope to earn a PhD at the California Institute of Technology in the same or related field of Aeronautics.

Experience:

During my undergraduate academic career, I have had the opportunity to participate in many pioneering student research projects. I am particularly proud of my experience in the Mars Gravity Biosatellite project as well as NASA's Reduced Gravity Student Flight Opportunities Program.

Mars Gravity Biosatellite, Systems Engineer:

I have been awarded a Mary Gates Endowment for Students Leadership Grant for my work as a Systems Engineer working on the Mars Gravity Biosatellite project. The Mars Gravity Biosatellite is a joint venture with three universities: the University of Washington (UW), the University of Queensland (UQ), in Australia, and the Massachusetts Institute of Technology (MIT). The spacecraft is designed to carry a small population of mice to low Earth orbit aboard a spacecraft whose spin will create

"artificial gravity" identical to that on the Martian surface. The seven-week mission will conduct an in-depth study of how mammals live in a reduced-gravity environment, and is expected to launch in 2006.

As a Systems Engineer, I provide the high-level design expertise to ensure that diverse subsystems function together correctly within the bus design as well as the entire satellite configuration. I am responsible for determining the overall system architecture, keeping track of interfaces and interactions between the three main subsystems, and assessing options for launch vehicles and ground communication stations. By allocating resources and keeping track of constraints across the entire development process, myself and other Systems Engineers ensure that the spacecraft and its supporting infrastructure will come in under budget and within the tight mass and volume restrictions imposed by launch.

NASA's Reduced Gravity Student Flight Opportunities Program, Flyer & Team Contact:

In December of 2003, our student project's proposal was accepted to participate in NASA's Reduced Gravity Student Flight Opportunities Program. Our team, also known as U:Drive, studied the effects of varying acceleration functions on Rayleigh-Taylor flow in a microgravity environment. We compared the results that we obtained in microgravity to those tested at the University of Washington (at 1-g) and are hoping to determine an acceleration function that minimizes the entrainment, or mixing region, between two fluids of differing densities. Rayleigh-Taylor flow has many applications - inertial confinement fusion, supernovae, volcanic eruptions, and other geophysical flows are examples where Rayleigh-Taylor instabilities occur.

In this research project, our team designed, created, and implemented an experiment (includes setup, apparatus, data collection and determination) that was used to study Rayleigh-Taylor flow on NASA's KC-135A aircraft (Vomit Comet) for the Reduced Gravity Student Flight Opportunities Program. Besides the experiment, our team conducted outreach and fundraising activities that comprised of the following: creating a website, organizing activities with other schools and organizations, participating in interviews with the press, and writing proposals requesting for aid.

Extra-curricular Activities:

I have been figure skating for sixteen years and plan on continuing my participation in the sport through either professional coaching or competitive judging. I have spent thirty hours per week involved in figure skating training activities while maintaining high honors in a full-time Aerospace Engineering curriculum. My partner, also my younger brother, and I have competed as a team for the past ten years and have represented the United States of America on the International Figure Skating Team for four years. Our successes ranged from a national title in 1999 to an Olympic Team alternate status in 2002.

Besides figure skating, I have been able to find time to participate with on-campus organizations. Many of my memberships and outside activities are with organizations that

provide services and support to underrepresented groups in science and engineering: women and minorities. I am an active member in Women in Science and Engineering (WiSE), the Society of Women Engineers (SWE), and Phi Sigma Rho, which is the only nation-wide engineering sorority. Due to my involvement in outreach activities for the NASA's Reduced Gravity Student Flight Opportunities Program, I have worked closely with WiSE and Minorities in Engineering and Science Achievement (MESA). I have helped these groups by participating in student panels, science fairs, and presentations to help inform and inspire others about engineering and science.